HIGH SCHOOL AND UNIVERSITY MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1928.

ALGEBRA 3.

Time—Three hours.

Values.

1. Attempt *two* parts only:

8 (*a*) Find a geometric series whose second term is 6 and sum to infinity 49.

8 (*b*) Three numbers whose sum is 27 are in *A.P.* If 1, 3 and 11 be added to them respectively the results will be in *G.P.* Find the two sets of numbers.

8 (*c*) The arithmetic mean between two numbers exceeds the geometric mean by 13 and the geometric mean exceeds the harmonic mean by 12. Find the numbers.

2. Attempt *one* part only:

9 (*a*) Find the sum of n terms of a series whose n^{th} term is $n^3 — 2^n$.

9 (*b*) If the sum of n terms of a series be $a+bn+cn^2$, find the n^{th} term and the nature of the series.

3. Attempt *one* part only:

9 (*a*) Given that y varies as the sum of three quantities, the first of which is constant, the second varies as x, and the third varies as x^2, and that when $x=a$, $2a$ and $3a$, $y=0$, a and $4a$, find y when $x=(n+1)a$.

9 (*b*) Given that the work done by $x—1$ men in $x+1$ days is to the work done by $x+3$ men in $x—2$ days as 20 : 21, find the value of x.

4. Attempt *one* part only:

8 (*a*) If $x^2+ax+10=0$ and $x^2+bx—10=0$ have a common root, show that $a^2—b^2=40$.

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Values.

8 (*b*) Solve $x^4-39x^2+66x-28=0$, being given that one root is $3+\sqrt{5}$.

8 **5.** (*a*) In how many ways can a committee of 5 be chosen from 4 men and 10 women so as always to include one man.

8 (*b*) How many numbers each containing 3 digits can be formed from the ten digits of our system of notation? In how many of these does the digit 5 occur?

6. Attempt *four* parts only:

8 (*a*) Show that the sum of the coefficients in the expansion of $(a+b)^n$ is 2^n.

8 (*b*) Find the coefficient of x^{17} in the expansion of

$$\left(\frac{x^2}{2}-\frac{2}{x}\right)^{16}.$$

8 (*c*) Show that the middle term in the expansion of $(1+x)^{2n}$ may be expressed in the form:

$$\frac{1.3.5\ldots\ldots\ldots(2n-1)}{\underline{|n}}.2^n.x^n$$

8 (*d*) Find the greatest term in the expansion of

$$(1+2x)^{20} \text{ when } x=\tfrac{1}{3}.$$

8 (*e*) Find the coefficient of a^{12} in the expansion of

$$\frac{4+2a-a^2}{(1+a)^3}$$

10 **7.** *Either* A city borrows by debentures \$400,000 bearing interest at 6% compounded annually. The loan is to be repaid, both principal and interest, in 30 equal annual payments. Find the amount of the annual payment.

Or A man wishes to provide for his wife an annuity of \$1200, the first payment to be made 4 years from now and the annuity to run for 10 payments. If money is worth 6% find what sum he should pay for the annuity.

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